

STRAINED SILICON ON RELAXED SiGe FILM
WITH UNIFORM MISFIT DISLOCATION DENSITY

ABSTRACT

A method for forming a semiconductor substrate structure is provided. A compressively strained SiGe layer is formed on a silicon substrate. Atoms are ion-implanted onto the SiGe layer to cause end-of-range damage. Annealing is performed to relax the strained SiGe layer. During the annealing, interstitial dislocation loops are formed as uniformly distributed in the SiGe layer. The interstitial dislocation loops provide a basis for nucleation of misfit dislocations between the SiGe layer and the silicon substrate. Since the interstitial dislocation loops are distributed uniformly, the misfit locations are also distributed uniformly, thereby relaxing the SiGe layer. A tensilely strained silicon layer is formed on the relaxed SiGe layer.

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